Markus Berndt

Scientist

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Education

5/1999	Ph.D. Applied Mathematics, Department of Applied Mathematics, University of Colorado at Boulder. Thesis title: Adaptive refinement and the treatment of singularities in first-order system least squares (FOSLS). Advisor: Prof. Stephen F. McCormick.
5/1996	M.S. Applied Mathematics, Department of Applied Mathematics, University of Colorado at Boulder.
6/1994	Diplom-Mathematiker, Lehrstuhl für Angewandte Mathematik, Universität Düsseldorf, Germany.

Professional experience

Since 10/2009	Scientist 3, Computer, Computational, & Statistical Sciences, CCS-2 Computational Physics Group, Los Alamos National Laboratory.
10/2008 -- 10/2009	Scientist 3, Theoretical Division, T-5 Applied Mathematics and Plasma Physics Group, Los Alamos National Laboratory.
12/2005 -- 9/2008	Technical Staff Member,Theoretical Division, T-7 Mathematical Modeling and Analysis Group, Los Alamos National Laboratory.
12/2000 -- 12/2005	Limited Term Staff Member, Theoretical Division, T-7 Mathematical Modeling and Analysis Group, Los Alamos National Laboratory.
6/1999 -- 12/2000	Postdoctoral Research Associate, Theoretical Division, T-7 Mathematical Modeling and Analysis Group, Los Alamos National Laboratory.

Publications

[1] Hybrid Remap for Multi-Material ALE, M. Kucharik, J. Breil, S. Galera, P.-H. Maire, M. Berndt and M. Shashkov, Computers & Fluids, (in press) 2010.

[2] Reduced-Dissipation Remapping of Velocity in Staggered Arbitrary Lagrangian-Eulerian Methods, David Bailey, Markus Berndt, Milan Kucharik and Mikhail Shashkov, Journal of Computational and Applied Mathematics, vol. 233, pp. 3148-3156, 2010.

[3] Efficient Nonlinear Solvers for Laplace-Beltrami Smoothing of Three-Dimensional Unstructured Grids, Markus Berndt, Glen Hansen and David Moulton, Computers & Mathematics with Applications , vol. 55, pp. 2791-2806, 2008.

Publications (continued)

[4] A Node Reconnection Algorithm for Mimetic Finite Difference Discretizations of Elliptic Equations on Triangular Meshes, Pavel Vachal, Markus Berndt, Konstantin Lipnikov, and Mikhail Shashkov, Communicatations in Mathematical Sciences, vol. 3, no. 4, pp. 665-680, 2005.

[5] Superconvergence of the velocity in mimetic finite difference methods on quadrilaterals, Markus Berndt, Konstantin Lipnikov, Mikhail Shashkov, Mary F. Wheeler and Ivan Yotov, SIAM J. Numer. Anal., vol. 43, no. 4, pp. 1728-1749, 2005.

[6] A Mortar Mimetic Finite Difference Method on Non-Matching Grids, Markus Berndt, Konstatin Lipnikov, Mikhail Shashkov, Mary F. Wheeler, and Ivan Yotov, Numerische Mathematik, vol. 102, no. 2, pp. 203-230, 2005.

[7] Analysis of First-Order System Least Squares (FOSLS) for Elliptic Problems with Discontinuous Coefficients: Part II, Markus Berndt, Thomas A. Manteuffel and Stephen F. McCormick, SIAM J. Numer. Anal., vol. 43, no. 1, pp. 409-436, 2005.

[8] Analysis of First-Order System Least Squares (FOSLS) for Elliptic Problems with Discontinuous Coefficients: Part I, Markus Berndt, Thomas A. Manteuffel, Stephen F. McCormick and Gerhard Starke, SIAM J. Numer. Anal., SIAM J. Numer. Anal., vol. 43, no. 1, pp. 386-408, 2005.

[9] Multilevel Accelerated Optimization for Problems in Grid Generation, M. Berndt and M. Shashkov, Proceedings of the 12th International Meshing Roundtable, Santa Fe, NM, 2003.

[10] Convergence of mimetic finite difference discretizations, M. Berndt, K. Lipnikov, D. Moulton, and M. Shashkov, East-West Journal of Numerical Mathematics, Vol. 9, No. 4, pp. 265-284, 2001.

[11] Local error estimates and adaptive refinement for first-order system least squares (FOSLS), Markus Berndt, Thomas A. Manteuffel, and Stephen F. McCormick, E.T.N.A., vol. 6, pp. 35-43, 1997

Technical Reports and Articles in Conference Proceedings

[1] Using the feasible set method for rezoning in ALE, Markus Berndt, Milan Kucharik, and Mikhail J. Shashkov, Procedia Computer Science, Vol. 1, No. 1, pp. 1879-1886, 2010.

[2] A memory efficient parallel tridiagonal solver, Travis Austin, Markus Berndt and David Moulton, LANL Technical Report LA-UR-03-4149, 2003.

[3] MLB: Multilevel load balancing for structured grid applications, Dan Quinlan and Markus Berndt, Proceedings of the SIAM Parallel Conference, Minneapolis, MN, March 1997.

[4] Multigrid on overlapping patches, Markus Berndt and Kristian Witsch, in Seventh Copper Mountain Conference on Multigrid Methods, vol. CP 3339, NASA, Hampton, VA, 1996, pp. 31-40.

Conference Presentations

[1] Using the feasible set method for rezoning in ALE, at International Conference on Computational Science, May 2010, Amsterdam, The Netherlands

[2] A Robust Mesh Untangling and Smoothing Method for ALE, SIAM Computational Science & Engineering, March 2009, Miami, FL.

[3] A robust ALE rezone strategy that is capable of mesh untangling (U), NECDC 2008, Livermore, CA.

[4] A Fast Geometric Mesh Untangling Algorithm for ALE Methods, SIAM Annual Meeting, July 2008, San Diego, CA.

[5] A Node Reconnection Algorithm for Mimetic Finite Difference Discretizations of Elliptic Equations on Triangular Meshes, at 2007 SIAM Conference on Mathematical and Computational Issues in the Geosciences, Santa Fe, NM.

[6] A Preconditioned Condition Number Based Mesh Relaxer for 2D Dendritic/AMR Meshes with Very Bad Aspect Ratios, Conference on Numerical methods for multi-material fluid flows, Prague, Czech Republic, September 2007.

[7] An Efficient Nonlinear Solver for a Mesh Smoothing Problem, LACSI Symposium, October 11, 2005.

[8] Toward an Efficient Nonlinear Solver for a Mesh Smoothing Problem, Copper Mountain Conference on Multigird Methods, Apr. 2005.

[9] Mesh Reconnection Method for the Solution of Elliptic Problems, SIAM Conference on Computational Science & Engineering, Orlando, FL, Feb. 2005.

[10] Parameter estimation via risk-based optimization, SIAM Annual Meeting, Portland, OR, July 2004.

[11] Line and Plane Relaxation in parallel BoxMG, Copper Mountain Conference on Iterative Methods, Copper Mountain, CO, March 2004.

[12] Parameter estimation via risk-based optimization, Los Alamos Computer Science Institiute Symposium, 2003.

[13] Multilevel accelerated optimization for problems in grid generation, 7th US Congress on Computational Mechanics in Albuquerque, 2003.

[14] Multilevel accelerated optimization for problems in grid generation. Copper Mountain Conference on Multigrid Methods, 2003.

[15] Multilevel accelerated optimization for unstructured meshes, Los Alamos Computer Science Institiute Symposium, 2002.

[16] Small Linux Cluster Workshop:Installing MPI and Running Parallel Code, At ASME International Mechanical Engineering Congress and Exposition, 2001.

[17] Small Linux Cluster Workshop: Installing MPI and Running Parallel Code, SIAM Annual Conference, San Diego, 2001.

[18] On a multilevel solver that utilizes singular basis functions for the solution of the diffusion equation with discontinuous coefficient. At 2000 Copper Mountain Conference on Iterative Methods, Copper Mountain, CO.

Conference Presentations (continued)

[19] On a multilevel solver for the flux based first-order system least squares formulation of the diffusion equation with discontinuous coefficient, At 2000 Arizona Days, Center for Nonlinear Studies, Los Alamos National Laboratory, Los Alamos, NM.

[20] Toward Multigrid for L2 FOSLS for the Diffusion Equation with Discontinuous coefficients and Singular Basis Functions. At 1999 Copper Mountain Conference on Multigrid Methods, Copper Mountain, CO.

[21] First-Order System Least Squares for Elliptic Problems with Discontinuous Coefficients. At 1998 Copper Mountain Conference on Iterative Methods, Copper Mountain, CO.

[22] Adaptive Mesh Refinement for Fist-Order System Least Squares. At 1997 Copper Mountain Conference on Multigrid Methods, Copper Mountain, CO.

[23] Multigrid on Overlapping Patches. At 1995 Copper Mountain Conference on Multigrid Methods, Copper Mountain, CO.

Activities

2003 -- 2007	Co-organizer of LANL's T-7 summer student program.
2004	Panelist for an NSF review panel.
1/2000	Co-organizer of Arizona Days at the Center for Nonlinear Studies at Los Alamos National Laboratory.
Since 2000	Reviewer for SIAM Journal of Numerical Analysis and SIAM Journal of Scientific Computing, E.T.N.A, IEEE, IMA Journal of Numerical Analysis, and Journal of Computational Physics.

Awards

6/2004	LAAP Teamwork Award (together with T. Austin, J. Dendy, and D. Moulton)
8/2004	LAAP Teamwork Award, (members of the T-7 Highlight Book team)

Professional Collaborations

1999 -- 2005	Stephen F. McCormick and Thomas A. Manteuffel, both at University Colorado at Boulder.
2003 -- 2005	Mary F. Wheeler, at University of Texas at Austin.
2003 -- 2005	Ivan Yotov, at University of Pittsburgh
Since 2008	Milan Kucharik, Czech Technical University in Prague, Czech Republic
Since 2010	Pierre-Henri Maire, Jerome Breil and Stephane Galera, Universite Bordeaux, France